
NUCLEAR LEVEL DENSITIES OF ^{56}Co , ^{57}Co , ^{90}Nb , ^{94}Nb FROM NEUTRON EVAPORATION SPECTRA

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Excitation functions, neutron spectra and angular distributions in (p,n) reaction on isotopes of ^{56}Fe , ^{57}Fe , ^{90}Zr , ^{94}Zr have been measured in proton energy range of (7-11) MeV. The measurements were performed by time-of-flight fast neutron spectrometer on the pulsed tandem accelerator EGP-15 of IPPE [1]. The high resolution (~ 0.6 ns/m) and stability of time-of-flight spectrometer allowed to identify reliably the discrete low-lying levels together with continuum part of neutron spectra. Analyses of the measured data have been carried out in the framework of statistical equilibrium and pre-equilibrium models of nuclear reactions. The calculations are done with computer code GNASH using the generalized superfluid model of nucleus, back-shifted Fermi-gas model and composite formula of Gilbert and Cameron for nuclear level density. The nuclear level densities of ^{56}Co , ^{57}Co , ^{90}Nb and ^{94}Nb , their energy dependences and model parameters have been determined. In energy dependences of the nuclear level density of ^{56}Co and ^{90}Nb in excitation energy range between well-known low-lying levels and continuum part of excitation spectra is displayed the structure connected with the shell unhomogeneties of a single-particle state spectrum for nuclei near filled shells. This effect for magic nuclei was marked already in our work [2]. It is shown also that the obtained experimental data differ essentially from the predictions of nuclear level density model systematics.

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2. B.V.Zhuravlev, A.A.Lychagin, N.N.Titarenko, V.G.Demenkov, V.I.Trykova. Izv.RAN, ser. fizicheskaya, (2003), V.67, N1, p.98-102.